

**REMARKS**

The Examiner's Official Action mailed March 20, 2002 has been received and its contents carefully noted. Claims 1-3 and 6-18 are pending in the present application and claims 1-3, 6-10, 15 and 17 are amended herewith. New claim 19 is submitted herewith in accordance with 37 CFR 1.607 to provoke an interference with U.S. Patent 6,147,451 as described in more detail below. Claims 1, 6, 9-10, 15, 17 and 19 are independent. For the reasons set forth below in detail below, all claims are believed to be in condition for allowance and favorable reconsideration of the outstanding rejections is requested.

Paragraph 2 of the Official Action rejects claims 1, 3 and 12 as obvious based on the combination of Applicant's alleged admitted prior art and U.S. Patent 4,511,756 to Moeller. Paragraph 3 of the Official Action further rejects claim 2 as obvious based on the combination of the alleged admitted prior art, Moeller and U.S. Patent 5,550,066 to Tang. Paragraph 4 of the Official Action rejects claims 6-9, 13 and 14 as obvious based on the combination of Tang, the alleged admitted prior art and Moeller.

As stated in MPEP § 2143-2143.01, to establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Claim 1 of the present application is directed to an organic electroluminescence display device and recites the use of a barrier metal comprising titanium (or titanium nitride) interposed between an electrode comprising aluminum and one of source and drain regions. The Official Action asserts that the alleged admitted prior art lacks only the teaching of a barrier metal of titanium and asserts that Moeller teaches a barrier metal comprising titanium. The Official Action further asserts that it would have been obvious to combine the teachings of the alleged admitted prior art and Moeller because they are in the same field of endeavor and that one of skill in the art would have been motivated to do so to prevent diffusion of aluminum into the silicon source or drain region and to thereby obtain the invention of claims 1, 3 and 12.

Applicants respectfully disagree. Moeller is directed to amorphous silicon solar cells and a method of producing the same, while the present invention is directed toward an electroluminescence (EL) display device and in particular those using an organic EL material. It is respectfully submitted that the alleged admitted prior art and Moeller are not within the same field of endeavor since solar cells and display devices are significantly different devices. Furthermore, one of skill in the art would not be motivated to combine the teachings of Moeller and the alleged admitted prior art absent some desirability to doing so (See MPEP 2143.01 Suggestion or Motivation To Modify the References, section entitled "THE PRIOR ART MUST SUGGEST THE DESIRABILITY OF THE CLAIMED INVENTION"). It is respectfully submitted that one of ordinary skill in the art would not have been motivated to combine these reference teachings from disparate fields since there is not disclosure or suggestion of the problem identified in the present application and thus no reason why one should combine the references as asserted in the Official Action.

Furthermore, Moeller teaches a barrier metal layer formed under a semiconductor layer, while the claimed barrier metal layer is formed between a semiconductor layer (source or drain) and a transparent electrode. Therefore, the structure of Moeller is significantly different from that of the present invention and, even if combined, one of ordinary skill would not achieve the present invention. Favorable reconsideration is requested in view of the above.

With respect to paragraph 4 of the Official Action and claims 6-9, 13 and 14, it should be noted that these claims further recite another barrier metal layer interposed

between the electrode comprising aluminum and the transparent electrode. It is respectfully submitted that Moeller, the alleged admitted prior art and Tang, alone or in combination, fail to disclose or suggest this feature of the present invention. Since the prior art references fail to teach or suggest all the claim limitations, it is respectfully submitted that a *prima facie* case of obviousness cannot be maintained and favorable reconsideration is requested.

Paragraph 5 of the Official Action rejects claims 10, 11 and 15-18 as obvious based on the combination of Tang and U.S. Patent 5,828,429 to Takemura. Tang is asserted to lack only disclosure of the peripheral driving circuit and Takemura is cited for teaching this feature. It is respectfully submitted, however, that neither Tang nor Takemura, alone or in combination, teach or suggest a peripheral driving circuit comprising thin film transistors formed over a same substrate as the thin film transistors of the pixels in combination with an organic electroluminescence display wherein the thin film transistors comprise crystalline silicon. Since the prior art fails to teach or suggest each and every feature, it is respectfully submitted that a *prima facie* case of obviousness cannot be maintained and favorable reconsideration is respectfully requested.

**Request for Interference under 37 CFR 1.607**

As noted above, Applicant submits new claim 19 herewith to provoke an interference with U.S. Patent 6,147,451 to Shibata et al. New claim 19 corresponds exactly to claim 6 of Shibata.

In accordance with 37 CFR 1.607(a)(2), applicant presents the following proposed count 1, wherein claim 6 of the '451 patent and claim 19 submitted herewith each correspond exactly to count 1:

1. An organic electroluminescent display device, wherein a pixel array composed of an organic electroluminescent device is provided on an insulating substrate, an island having a polycrystalline silicon semiconductor formed thereon in a predetermined pattern is

provided on said substrate, and a thin film transistor formed in the island is used as a pixel driving device and a peripheral driving circuit device.

In accordance with 37 CFR 1.607(a)(5), copied claim 19 may be applied to applicant's disclosure as follows:

An organic electroluminescent display device,	The title of the present application is " <i>Thin Film Transistor, Organic Electroluminescence Display Device and Manufacturing Method of the Same</i> " and the specification generally refers to an organic electroluminescence display device throughout.
wherein a pixel array composed of an organic electroluminescent device is provided on an insulating substrate,	Figure 4 shows an array of pixels. Figure 3 further illustrates a process of forming the organic electroluminescent device and on page 8, lines 24-25 the specification teaches a transparent substrate 101 such as a quartz substrate, a glass substrate, or a ceramic substrate, which supports an "insulating substrate."
an island having a polycrystalline silicon semiconductor formed thereon in a predetermined pattern is provided on said substrate, and	Page 8, lines 24-29 disclose "an active silicon layer 102 with an island shape" that is annealed "to form a polysilicon layer."
a thin film transistor formed in the island is used as a pixel driving device and a peripheral driving circuit device.	Page 8, lines 18-23 disclose "that manufacturing processes of the switching thin film transistor and another thin film transistors which constitute peripheral driving circuits of the EL element will be the same as following processes of the current control thin film transistor." The specification then describes "an active silicon layer 102 with an island shape" as noted above.

U.S. Patent 6,147,451 issued November 14, 2000, more than 1 year prior to the subject amendment. In accordance with 37 CFR 1.607(a)(6) and 35 U.S.C. 135(b), it is respectfully submitted that dependent claim 11 and independent claim 10 from which it

depends recite substantially the same subject matter as claim 19. Claim 11 was added to the present application in an amendment filed June 15, 2001, almost 5 months before the issue date of the '451 application.

As submitted in the amendment filed June 15, claims 10 and 11 read:

10. An organic electroluminescence display device comprising:
  - a substrate having and insulating surface;
  - at least one X-direction signal line over said substrate;
  - at least one Y-direction signal line crossing said X-direction signal line;
  - a thin film transistor formed over said substrate at an intersection of said X-direction signal line and said Y-direction signal line, said think [sic, later amended to "thin"] film transistor comprising an active layer comprising crystalline silicon including source, drain and channel regions;
  - a transparent electrode electrically connected to said thin film transistor;
  - an organic luminescence layer adjacent to said transparent electrode; and
  - a peripheral driving circuit comprising another thin film transistor formed over said substrate for supplying a signal to one of said X-direction signal line and said Y-direction signal line.

11. The display device according to claim 10 wherein said thin film transistor and said another thin film transistor are manufactured simultaneously.

Claim 10 and 11 clearly recite an organic electroluminescent display device comprising a pixel array formed on an insulating substrate wherein thin film transistors

formed of crystalline silicon are used as pixel TFTs and peripheral circuit TFTs. As set forth in MPEP 2307, in order for an application claim to be for "substantially the same subject matter" as a patent claim, it must contain all the material limitations of the patent claim. *Parks v. Fine*; 773 F.2d 1577, 227 USPQ 432 (Fed. Cir. 1985), *modified*, 783 F.2d 1036, 228 USPQ 677 (1986). It is respectfully submitted that claims 10 and 11 of the subject application as filed in the amendment of June 15, 2001 contained all of the material limitations of claim 6 of the '451 patent and thus satisfied the requirements of 35 U.S.C. 135(b).

The subject application is a divisional of U.S. Patent Application Serial Number 08/855,391 filed May 13, 1997 (now U.S. Patent 5,897,328), which is a divisional of U.S. Patent Application Serial Number 08/617,121 filed March 18, 1996 (now U.S. Patent 5,640,067). The subject application also claims priority to Japanese Patent Application number 07-065943 filed March 24, 1995. U.S. Patent 6,147,451 was filed August 6, 1998 and claims priority on its face to Japanese Patent Application number 09-214724 filed August 8, 1997. Since the subject application has an effective U.S. filing date (March 16, 1996) earlier than the effective U.S. filing date of the '451 patent (August 6, 1998), it is respectfully request that the assignees of the present application, Semiconductor Energy Laboratory Co., Ltd. and TDK Corporation be designated as senior parties in any interference in accord with 37 CFR 1.601(m).

For the above reasons, the present application is believed to be in condition for allowance and favorable reconsideration is requested in view of the above remarks and amendments. Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

1. (Amended) An [organic] electroluminescence display device comprising:  
a substrate having an insulating surface;  
a thin film transistor formed over said substrate, said thin film transistor comprising an active layer comprising crystalline silicon including source, drain and channel regions;  
an electrode comprising aluminum electrically connected to one of said source and drain regions;  
a barrier metal layer interposed between said electrode and said one of the source and drain regions to prevent a direct contact therebetween;  
a transparent electrode electrically connected to said thin film transistor; and  
an [organic] electroluminescence layer comprising an organic material adjacent to said transparent electrode,  
wherein said barrier metal layer comprises titanium.
2. (Amended) An [organic] electroluminescence display device according to claim 1 wherein said transparent electrode comprises indium tin oxide.
3. (Amended) An [organic] electroluminescence display device according to claim 1 wherein said barrier metal layer contains nitrogen.
6. (Amended) An [organic] electroluminescence display device comprising:  
a substrate having an insulating surface;  
a first thin film transistor disposed over said substrate, wherein said first thin film transistor comprises an active layer comprising crystalline silicon including source, drain and channel regions, and a gate electrode adjacent to the channel region;  
a second thin film transistor disposed over said substrate, [substrate];  
wherein] said second thin film transistor [comprises] comprising an active layer comprising crystalline silicon including source, drain and channel regions, and a gate electrode adjacent to the channel region,

[wherein] said gate electrode of the second thin film transistor [is] being electrically connected[,] to said drain region of the first thin film transistor;

[a conductive layer disposed between] an electrode comprising aluminum for electrically connecting said transparent electrode and said drain region of the second thin film transistor; and

an [organic] electroluminescence layer comprising an organic material disposed adjacent to said transparent electrode,

wherein [said conductive layer comprises titanium] a direct contact between said electrode and said transparent electrode and a direct contact between said electrode and said drain region of the second thin film transistor are prevented by a barrier metal layer comprising titanium interposed therebetween.

7. (Amended) An [organic] electroluminescence display device according to claim 6 wherein said [conductive] barrier metal layer further contains nitrogen.

8. Amended) An [organic] electroluminescence display device according to claim 6 further [comprises] comprising a counter electrode opposed to said transparent electrode with said organic electroluminescence layer interposed therebetween, wherein said counter electrode comprises magnesium and silver.

9. (Amended) An [organic] electroluminescence display device comprising: a substrate having an insulating surface; a thin film transistor formed over said substrate, said thin film transistor comprising an active layer comprising crystalline silicon including source, drain and channel regions;

an electrode comprising aluminum electrically connected to one of said source and drain regions;

a barrier metal layer interposed between said electrode and said one of the source and drain regions to prevent a direct contact therebetween;

a transparent electrode electrically connected to said thin film transistor; an organic electroluminescence layer adjacent to said transparent electrode; [and]

an electroluminescence layer comprising an organic material disposed adjacent to said transparent electrode, and

a peripheral driving circuit comprising another thin film transistor formed over said substrate,

wherein said barrier metal layer comprises titanium.

10. (Amended) An [organic] electroluminescence display device comprising:
  - a substrate having an insulating surface;
  - at least one X-direction signal line over said substrate;
  - at least one Y-direction signal line crossing said X-direction signal line;
  - a thin film transistor formed over said substrate at an intersection of said X-direction signal line and said Y-direction signal line, said thin film transistor comprising an active layer comprising crystalline silicon including source, drain-and channel regions;
  - a transparent electrode electrically connected to said thin film transistor;
  - an [organic] electroluminescence layer comprising an organic material adjacent to said transparent electrode; and
  - a peripheral driving circuit comprising another thin film transistor formed over said substrate for supplying a signal to one of said X-direction signal line and said Y-direction signal line wherein said another thin film transistor has an active layer comprising crystalline silicon.

15. (Amended) An [organic] electroluminescence display device comprising:
  - a substrate having an insulating surface;
  - at [lease] least one X-direction signal line over said substrate;
  - at least one Y-direction signal line crossing said X-direction signal line;
  - at least one pixel defined at an intersection between the X-direction signal line and the Y-direction signal line;
  - at least one switching thin film transistor and one current control thin film transistor provided over the substrate in said pixel;
  - an [organic] electroluminescence layer comprising an organic material over the substrate; and

a peripheral driving circuit comprising at least a third thin film transistor formed over said substrate for supplying a signal to at least one of said X-direction signal line and said Y-direction signal line,

wherein each of the switching thin film transistor, the current control thin film transistor and the third thin film transistor comprises a semiconductor layer comprising crystalline silicon and including source, drain and channel regions, a gate insulating film adjacent to the semiconductor layer and a gate electrode adjacent the gate insulating film.

17. (Amended) An electroluminescence display device comprising:

a substrate having an insulating surface;

at [lease] least one X-direction signal line over said substrate;

at least one Y-direction signal line crossing said X-direction signal line;

at least one pixel defined at an intersection between the X-direction signal line and the Y-direction signal line;

at least one switching thin film transistor and one current control thin film transistor provided over the substrate in said pixel;

an [organic] electroluminescence layer comprising an organic material over the substrate; and

a peripheral driving circuit comprising at least a third thin film transistor formed over said substrate for supplying a signal to at least one of said X-direction signal line and said Y-direction signal line,

wherein each of the switching thin film transistor, the current control thin film transistor and the third thin film transistor comprises a semiconductor layer comprising crystalline silicon and including source, drain and channel regions, a gate insulating film adjacent to the semiconductor layer and a gate electrode adjacent the gate insulating film, and is manufactured through the same process.